The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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A Great Chemistry Teacher

A SHORT while ago the first of a series of lectures designed to preserve the memory of Professor H. E. Armstrong was very fittingly delivered by his son Dr. E. F. Armstrong, who gave a well-balanced account of his father's life and work; and this week Dr. Armstrong has delivered another address on the same subject, entitled, "Out of Victorian Days," to the Oil Industries Club and Fuel Luncheon Club. Professor Armstrong was, particularly in his later years, a welcome and regular contributor to THE CHEMICAL AGE, and we are glad of this opportunity of an appraisement of his work and influence.

Future generations of chemists will perhaps wonder at the eminent place which Professor Armstrong occupied in national and international chemistry. No important chemical discoveries are associated with his name. He was not a great scientist in the same sense as were Boyle, Dalton, Davy, Faraday, Kelvin, J. J. Thomson, Rutherford, and others who were his contemporaries or predecessors. He was not a great lecturer. But "he did bestride the narrow world like a colossus." If we seek for the secret of the vast influence that Armstrong undoubtedly had in his generation, and beyond it through those whom he trained, we shall probably find it to lie in his own individuality. He was strongly individualistic and gloried in being so. He had original ideas and, particularly in his later years, he enjoyed being provocative.

His interest in chemistry was, no doubt, over-riding, but he was also vitally interested in geology and in medicine, in art and music, in agriculture, and in a wide range of sciences generally. He knew almost everyone of importance in those fields in which he was interested, so that although he was by training a chemist he was by instinct and application a man of science and of the arts in the widest sense of the terms.

Armstrong's great work was on the educational side. He had his opportunity in early life of specialising as a chemist and he might well then have made great discoveries. He found his work, however, in planting the seed of chemistry in places where before his day there was no chemistry, and as a result of the work of himself and his contemporaries, ably carried on by his pupils, the profession and practice of chemistry has attained its present dimensions. Others were doing similar work in Germany and it is difficult to conceive what would be our condition to-day if Armstrong and men like him had not successfully planted the seed and nurtured the chemical plant throughout our national structure.

There are many lessons that the ambitious student can learn from Armstrong's example. Like Chaucer's learned clerk, "gladly wolde he learne and gladly teche." He cultivated his powers of observation, often remarking that "there are some people who see very little and others who see a great deal in the same thing." To see a great deal in one mark of the successful chemist, and it is surprising how often even the trained chemist fails to see wood for trees and thus misses a discovery of considerable magnitude. Chemists are to-day brought up on a basis of exact measurement and they are too often prone to confine their observational powers to the tables of results compiled after experiments are concluded, and too seldom make their observations during the experiments. It must be counted a defect in the present system of mass chemical research that the heads of departments too often do no chemical experiments themselves and thus do not give themselves the opportunity of finding the truth through visual observation.

One of Armstrong's principal characteristics was that he was always endeavouring to learn how things had been found out, and thus to acquire a knowledge of the methods by which discoveries had been made. To do this was his constant advice to his students. He cultivated a wide range of scientific acquaintances and friends because of his desire to learn what other people were thinking about. The chemist to-day too often shuts himself up in a laboratory and does not mix with his fellows. That is a general criticism that industrialists and engineers level against the chemist. More things are wrought by personal contact and by the interplay of imaginations than by any other single method of human activity. Throughout his life Armstrong insisted that chemists should get as wide an education as possible and his own life was a living embodiment of how this could be put into practice. Dr. E. F. Armstrong interpolated a remark that even in his father's day "chemists had the idea that it was not worth being educated unless they got a degree at the end of it." That is a devastating piece of criticism; but is it the fault of the chemist? Is it not the fault of their employers who confuse the possession of degrees with the ability of the possessor? All good educationalists, Armstrong not least among them, deplore the necessity for examinations. Armstrong's example reminds us that, even if it is found necessary to pass examinations and obtain a degree, the acquisition of a chemist's education, in the fundamental sense in which the giants of the past were educated, is something that we chemists owe to ourselves and to the world about us.

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NOTES AND COMMENTS

Safety in the U.S. Chemical Industry

THE passage of the " Lease and Lend " Bill through the United States legislature will inevitably lead to increased and intensive activity in American munition works and to the absorption therein of unskilled and semi-skilled labour. Doubtless anticipating the political situation, the National Safety Council warns operatives in America's industrial plants against the dangers of undue haste. British precedents are quoted, stressing the unwisdom of too much overtime, and it is insisted upon that increased output must not be gained at the expense of health and safety; already in recent weeks several plant accidents of disquieting magnitude have occurred. One danger which in this country has so far been effectively dealt with, but which may well be a menace to American war industry, is sabotage. The Hon. J. Parnell Thomas, representative for New Jersey and a member of the Dies Committee of Investigation, is quoted as having written: "I make this prediction regarding sabotage to you men who manage America's industrial plants. Be on your guard. You haven't seen anything yet." The chemical industry is advised to pursue its normal sequence: laboratory—pilot plant—commercial plant, despite temptation, under urgent defence needs, to skip steps in the process. With proper precautions and careful vigilance, and without reckless haste, the American chemical industry should be able to carry out its defence duties without an undue proportion of war casualties.

Concentration of Production

THE President of the Board of Trade has explained the Government's policy for concentrating production. He made it clear that the policy did not require the formulation of schemes for whole industries or sections of industries. Indeed, the delay involved in preparing such schemes would be a fatal obstacle to the achievement of the Government's main objective, namely, a rapid measure of concentration of our resources. An undertaking with three factories at work on a part-time basis can play its part immediately by arranging to close down one of them, thereby concentrating production in two of them, assuming that this gives the required degree of concentration; nor is there any reason why three individual firms, small or large, should not take a similar action by arrangement among themselves. Such arrangements would be subject to the concurrence of the Ministry of Labour, on questions of labour, and of the Board of Trade. Once the arrangements are confirmed the firms will qualify immediately for the privileges to be given to "nucleus'" firms. Those privileges include the following: (a) The firm will be eligible for inclusion on the list of protected firms. This will result in a lower age of reservation for its workers than if it were not, and the fact that it is on the list will be taken into consideration in dealing with applications for deferment. (b) The Ministry of Labour will safeguard the labour requirements of these firms in appropriate cases upon the recommendation of the Board of Trade. (c) Government orders will as far as possible be given to these firms. (d) The Board of Trade will prevent the factories so far as possible from being requisitioned. (e) Help will be given to these firms to safeguard as far as possible their supplies of raw materials.

Aluminium Hydroxide Sol

A NEW method of preparing a stable aluminium hydroxide sol is described by Katsurai and Kita in *Bull. Chem. Soc. Japan,* November, 1940 (p. 458). The gelatinous hydroxide is prepared in the first place by stirring aluminium chloride solution with a slight excess of ammonia at the ordinary temperature, repeatedly washing and centrifuging the precipitate until the supernatant liquid is not coloured by phenolphthalein, but still gives a positive reaction for chlorine when tested with silver nitrate. Retention of a trace of chlorine is an essential condition for stable sol formation. The supernatant liquor is therefore not discarded, but is well mixed with the gelatinous precipitate and the whole is transferred to a fused quartz beaker in a steel autoclave where it is left for one hour at 190° C. and then allowed to cool to room temperature. There is obtained a uniformly turbid sol which does not coagulate when left for three weeks at room temperature. If the trace of chlorine is removed from the sol by dialysis the stable period is reduced to 4-5 days. It is impossible to obtain a sol at all by this autoclave process if the original precipitate is entirely washed free of chlorine before autoclaving, or even if a little ammonium chloride is added to the chlorine-free hydroxide in the autoclave.

The Upper Atmosphere

MAN is exploring to-day in regions into which he has not ventured for eons of time, since, in fact, he was one with his primeval ancestors, the fishes and birds. The great depths of the seas are reached by dredging, and observation at less depths by the bathysphere. The chemical exploration of the stratosphere is now also proceeding apace. Samples of air are taken by sounding balloons which have gone up as high as 30 km. The results show that from 20 km. onwards the content of helium increases, while the oxygen content decreases, thus indicating that at this height the stratospheric winds are no longer sufficiently powerful to cause the gases to mix, and the constituents of the atmosphere begin to separate according to their density. There is also an ozone layer lying between 20 and 30 kms. in height. Will this apparently academic study prove in another generation the basis of a new chemical industry? Will man drag down helium and other rare gases from the upper atmosphere before they escape from the gravitational pull of the earth for ever and use them for his own purposes before releasing them (no doubt accidentally) for them to make their way back again to the stratosphere?

MODERN DETERGENTS, I

Some Observations on Recent Practice

by GEORGE S. COLLINGRIDGE, B.Sc.

ALTHOUGH some very significant advances have been made during recent years in the development of improved detergents, old ideas and methods still persist, fulfilling a definite function and purpose of their own. At present there is no question, therefore, of fatty alcohol sulphates completely replacing soaps, or of tetrasodium pyrophosphate and other recently developed alkalies replacing washing soda or sodium silicate. But with this continual widening of the boundaries of the detergent industry, opportunities for improved technique in the textile and laundry trades have already shown a remarkable increase.

It is essential, when attempting to evaluate modern detergents, to regard them in proper perspective, against the background of all that has gone before. Sulphated fatty alcohols and sulphonated oils must be compared and contrasted with soaps, and sodium metaphosphate with sodium carbonate, etc. Any so-called improved colloidal detergents must likewise be considered in relation to starch, kaolin, bentonite, and similar materials.

One of the earliest known detergents was fullers' earth, which is still utilised to a very limited extent for the scouring of heavy serges. The Romans made use of decomposed urine, which probably acted as a detergent by reason of its content of ammonium carbonate and traces of more or less complex colloidal substances. But the first definite advance was in the development of soaps *circa* 600 B.C., although soap manufacture existed on a purely empirical small-scale basis until the Leblanc process for caustic alkali production was introduced, in the early days of the nineteenth century. This was followed by the classic researches of Chevreul into the constitution of fats—inaugurating a line of inquiry that has been effectively followed up by such notable workers as Professor T. P. Hilditch and his colleagues.

During the past few decades many attempts have been made to improve the technique of soapmaking; thus new types of prodder have been devised for toilet soap, as well as cooling presses, closed boiling pans, spray nozzles for soap powder, and so on. Although it may be a little outside the scope of the present discussion, some passing reference should certainly be made to what is undoubtedly the most revolutionary development in soapmaking methods, *i.e.*, the continuous process, as already utilised in at least one large soapworks, on a fully-fledged factory scale. By this means, it is hoped to replace batch methods with a continuous and almost automatic fat-splitting, saponification, and soap-spraying procedure. Whether or not this pioneer method will become in time the standard procedure remains to be seen—but there is no doubt that it deserves the very serious attention of all soap chemists.

Various materials, old and new, have been suggested for incorporation in soaps, in order either to improve the detergency of the latter or to achieve the same standard of detergency at lower cost. Leaving aside, for the moment, consideration of the fatty alcohol sulphates, we may conveniently examine the chemistry and application of sodium sesquisilicate, tetrasodium pyrophosphate and sodium metaphosphate.

The Newer Phosphates

Sodium metaphosphate was selected by the Association of British Chemical Manufacturers as the most outstanding new chemical of the year at the British Industries Fair in 1935. The well-known disodium and trisodium phosphates are salts of orthophosphoric acid, H_3PO_4. Sodium metaphosphate is similarly a salt of metaphosphoric acid, HPO_3. The chemistry of the metaphosphates is very complex, as a glance at the technical literature will show. It is possible to prepare several forms of sodium metaphosphate, and these have very different properties; for example one form is insoluble in water, while other forms are extremely soluble. The different forms have different molecular weights, the insoluble type being sodium monometaphosphate, or $NaPO_3$, while the best known of the soluble forms is sodium hexametaphosphate, or $NaPO_3$, while the best known of the soluble forms is sodium hexametaphosphate, or $(NaPO_3)_6$. This latter is the main constituent of the commercially available product (Calgon) and the active agent in the solution of calcium salts. There is evidence that its formula should be written. $Na_2(Na_4PP_6O_{18})$, indicating that all the metaphosphate radicals and four of the sodium atoms are in a "complex." If a calcium salt is added to a solution of this form, then the following type of reaction takes place:

$$2CaCl_2 + Na_2(Na_4P_6O_{18}) = 4NaCl + Na_2(Ca_2P_6O_{18})$$

The calcium atoms have entered the "complex" and the resultant compound, though soluble, does not show the ordinary reactions of a calcium salt, for calcium ions as such have been removed. If an insoluble calcium salt—calcium carbonate, calcium phosphate or calcium soap—is added to a solution of sodium hexametaphosphate, the same type of reaction takes place. Sodium carbonate, phosphate, or soap is formed and the calcium enters the soluble complex salt $Na_2(Ca_2P_6O_{18})$. The result is that the calcium carbonate, phosphate, or soap is taken into solution.

Properties of Sodium Metaphosphate

It is largely upon this remarkable reaction that the excellent detergent properties of sodium metaphosphate depend. The locking-up and solubilising of the hardness-forming constituents of water is obviously much more interesting and important than mere water-softening properties. The effect of the admixture of sodium metaphosphate with detergent compounds has been investigated by Schwartz and Gilmore[1] and compared with the behaviour of several commercial dish-washing preparations. Such mixtures containing sodium hexametaphosphate were, in every case, found superior to the products now available. By reason of its excellent detergent properties, its non-corrosive action on aluminium, and its complete prevention of film, the following composition was judged the best of all studied: sodium metaphosphate 40 per cent., trisodium phosphate monohydrate 15 per cent., sodium metasilicate pentahydrate 40 per cent., and sodium hydroxide 5 per cent.; or the dehydrated equivalent: sodium metaphosphate 48 per cent., trisodium phosphate 18 per cent., sodium metasilicate 28 per cent., and sodium hydroxide 6 per cent.

Commercial sodium hexametaphosphate is supplied in the form of colourless, glass-like plates, about 1 in. across and $\frac{1}{8}$ in. thick. The material is non-caustic (pH of a dilute solution is about 7.2), and also non-toxic and non-irritant to the skin. It is so "safe" in use that it has been successfully employed in cosmetics and in the treatment of certain skin diseases.

Practical tests have demonstrated several points in favour of the use of sodium metaphosphate as a detergent in commercial laundries. It is not intended to replace soap, but rather to remove insoluble soaps precipitated in the materials washed. Quantitative experiments carried out at the American Institute of Laundering showed that the use of metaphosphate in the fourth suds of a five-suds formula permitted the elimination of one hot rinse[2]. A reduction of 50 per cent. of bleach and of 31 per cent. of soap was made possible. The reduction in the amount of bleach is emphasised as an important step in prolonging the life of the laundered clothes. Owing to its neutral reaction, sodium metaphosphate does not attack the fibres of silk, wool, or rayon. Measurements of tensile strength after several washings showed that the change in tensile strength caused by washing with soap and metaphosphate was no greater than that produced by soap alone.

Sodium metaphosphate does not cause fading of coloured

fabrics. Rather it tends to produce an effect in the opposite direction, as deposition of lime soaps causes coloured materials to become somewhat dulled. Prevention of this tends to preserve the original brightness. Special emulsifying power for grease has been demonstrated by the use of sodium metaphosphate in washing greasy overalls; it is effective as a detergent against grease, even without the use of soap or alkali. Besides its usefulness in laundering, sodium metaphosphate has been recommended to the textile trade. Its property of dissolving lime soaps and thus regenerating sodium soap is of importance in improving a scouring liquid. Used in wet-finishing, it gives brighter and clearer shades in subsequent dyeing operations. It is an assistant in bleaching, making feasible a reduction in the amount of bleach used.

Because of its attack on grease, sodium metaphosphate has been recommended for washing paint, lacquer, varnish, and enamels. It will not injure the finish and leaves a clean, streakless surface with very little effort. It cannot, however, be used on wax finishes as it will attack the wax.

Pyrophosphate

Another important development in the field of alkaline detergents and soap builders is the comparatively recent introduction of tetrasodium pyrophosphate. This is prepared commercially in two forms, of which the anhydrous salt, $Na_4P_2O_7$, is by far the more important. This is a white powder, obtainable in a very pure state, with traces only of the ortho- and meta-phosphates and sodium carbonate. The crystalline salt, $Na_4P_2O_7.10H_2O$, appears as beautiful needles. The anhydrous salt has a solubility in water at 20° C. of 5·5 gm. per 100 gm. water, rising to a maximum of 56·7 gm. per 100 gm. water at approximately 80° C. In common with many salts of this type, it dissolves readily, although the process can be accelerated by breaking down any hard lumps which form by hydration.

In aqueous solutions, tetrasodium pyrophosphate hydrates very slowly to orthophosphate, but the reaction is more rapid in the presence of acid. The addition of alkali does not appear to have much effect on it. Tetrasodium pyrophosphate would be classed with sodium sesquicarbonate as a mild alkali, a 1 per cent. solution having a *p*H value of about 10.1 at ordinary temperatures.

Janota and Hull[3] go so far as to claim that "recently there has been a marked change in the composition of soap mixtures for household use, which has made them better washing compounds without added cost to the consumer. The compound which has brought about this improvement is tetrasodium pyrophosphate, $Na_4P_2O_7$." These authors proceed to discuss at some length the function of tetrasodium pyrophosphate in soap mixtures, their paper concluding with the following summary of the advantages resulting from its use:

1. Tetrasodium pyrophosphate, when it constitutes 10-15 per cent. of the soap mixture, saves soap to the extent of 20-30 per cent. by completely preventing the magnesium ion from precipitating soap. At higher levels a partial elimination of the calcium ion will also result.
2. It reduces the insoluble soap content of the wash water by 20-30 per cent. because it reduces the magnesium and calcium ion content of the solution by this amount.
3. Because of these facts, more soap is made available for washing and dispersing the solids, less insolubles are present to complicate dirt removal, resulting in better washing solutions at no additional cost.

According to the English soap chemist, J. M. Vallance, soap powders for the domestic market may be improved in their performance if they contain about 10 per cent. tetrasodium pyrophosphate, owing to the enhanced emulsifying and dispersing power. This leads not only to better washing results in the home laundry, but also (particularly when the powders are used in dish-washing) to freedom from scum on the side of the basin. An improved lathering of the soap has also been observed. Further, the alkalinity of the pyrophosphate is such that the powders will not cause damage to the skin or to delicate fibres such as wool and silk. Although the pyrophosphate can be added to the powdered soap, it is customary to add it to the soap in the crutcher. Tetrasodium pyrophosphate is itself a useful detergent, but it is not sufficiently alkaline for many purposes and must be mixed with stronger alkalies, such as trisodium phosphate or sodium metasilicate. By preventing the precipitation in adherent form of the calcium salts of the other alkalies, it enables the latter to exercise their full cleansing power.

Detergents for the washing of bottles and dishes, as well as for metal-cleaning, can all be improved by the addition of pyrophosphate. In mixed detergents in conjunction with sulphated alcohols, it is very effective, mixtures containing considerable proportions of pyrophosphate having been shown to be often as good as the sulphated alcohol used by itself.[4]

Sodium Metasilicate

Considerable improvements have been carried out, during recent years, in the manufacture of sodium metasilicate. From a gummy, lumpy material it can nowadays be transformed into pure crystals or a white, free-flowing, readily soluble powder, although it is also marketed in the form of solutions of varying concentrations, ranging from viscous semi-liquids to thin watery fluids. These improvements have widened the field of application of sodium metasilicate, which is now used in specialised cleansers for laundries, restaurants, dairy and bottling plants, metal-working plants, etc., as well as in the soap, paint, and other industries. The metasilicate has outstanding properties as a detergent, one of which is a remarkable ability to wet oily surfaces. It does not attack metals readily—a fact that is of considerable significance to manufacturers of alkaline specialities packed, for example, in aluminium tubes. The following formula for a household detergent powder (for dish-washing, etc.) has been suggested by Ralph H. Auch; it serves quite usefully to illustrate the application of the various raw materials specified:

Sodium sesquicarbonate	35%
Sodium metasilicate	15%
Tetrasodium pyrophosphate	25%
Soap	25%

Sodium Sesquisilicate

Sodium sesquisilicate has been described as another link in the chain of soluble silicates for detergent use. With a theoretical formula of $3Na_2O.2SiO_2.11H_2O$ or $Na_3HSiO_4.5H_2O$, it is more markedly alkaline than the metasilicate—a property that especially fits it for certain applications, but by no means all. There are, for example, many cases where the higher *p*H would be undesirable or unnecessary. It is more likely to etch sensitive metals than is the metasilicate, but much less likely to affect them adversely than are caustic or even some of the other alkalies often regarded as mild. It should be remembered that the buffering effect of silica is available only in the soluble silicates.

In substituting sesquisilicate for metasilicate only four-fifths as much should be used at the beginning, and this may in many cases be reduced because a higher *p*H will result. Where it is desired to maintain the same *p*H as given by metasilicate, only one-half as much sesquisilicate should be used. Combined with a small amount of soap, five to ten per cent. sesquisilicate makes a very good cleaner for garage floors, grease-pits, etc. The powder may simply be sprinkled over the greasy surface, allowed to remain a few minutes and then flushed off with a hose; the dirty oil is floated loose and washed into the drain. The same process may be used for cleaning floors in food factories, packing houses, etc. So also may heavy, greasy machinery be cleaned and paraffin oils, drawing compounds, or lubricating greases removed from metal surfaces.[5]

(To be continued.)

The February number of *The Stantonian*, issued by the STANTON IRONWORKS, CO., LTD., near Nottingham, is as usual well illustrated and contains an interesting article on the chemical treatment of water used for steam raising.

Notes from Works Safety Jottings

The Personal Factor

by JOHN CREEVEY

UNDER the Factories Act of 1937, all factories must have either "first aid" boxes or cupboards or an ambulance room, and sometimes both are required. The wisdom of this requirement of the law, apart from all other considerations, becomes apparent when it is mentioned that there are 20,000 factory injuries every year which not only cause three or more days absence from work, but also become septic. If it were not for the provision of the facilities mentioned it is likely that the number of cases where a wound becomes septic would be considerably higher than 20,000 every year. The minute germs which cause the infection often get into the damaged skin or deeper tissues shortly after the accident has happened and not at the actual moment. For that reason much may be done to prevent subsequent troubles by applying "first aid" promptly, however slight the wound may be. Even a minor scratch may be dangerous in an environment where there are infectious germs. But at works where chemicals are handled there is a further risk of poisoning being set up by chemicals entering the wound, though often only infinitesimal traces may be involved. Here there is additional need of precaution in the matter of how to regard a mere scratch or a cut, and we should act accordingly.

* * *

Now that a number of people new to the job are engaged in war industry, there is additional need for impressing upon them the way in which accidents happen and what should be done to reduce these or to minimise the ultimate effects of those which occur. Acting in co-operation, the Factory Department of the Ministry of Labour and National Service, and the National Safety First Association (now known as the Royal Society for the Prevention of Accidents), have already issued some helpful leaflets. One of them wisely states that "although factories are not specially dangerous places you can easily get hurt," and it shows in humorous fashion just where to look for dangers, or rather where and under what circumstances danger may arise. Although written mainly from the viewpoint of factories and workshops generally, there is on the last page a few words of advice that can be wisely brought to the attention of all workers in the chemical industry. "You must use safety appliances provided under the law. You must not interfere with or misuse what is there for your safety, health or welfare. You must not wilfully and without reasonable cause do anything liable to endanger yourself or others." "Screens, goggles, gloves and similar devices are meant for your protection," states the Factory Worker's Safety Code; "wear them even if this means a little inconvenience: a little inconvenience is better than an injury."

* * *

To those acting in a supervisory capacity a special leaflet, called the Foreman's Leaflet, is addressed. Those with authority and ability to exercise personal supervision are in a specially responsible position for making production as accident-free as possible. Firstly, they should see that the orders which they give always include precise instructions about the safe way to do a job that is unfamiliar to a particular worker; secondly, they should see that the job is actually done in the safe way; thirdly, by personal influence they can do much to instil a spirit of "safety-mindedness" among the workers under them. Instructions are sometimes ignored because people do not understand the sound reasons behind them; bear this in mind, and be ready to explain. Many accidents could have been avoided if there had been a little more knowledge as to why a thing was done in a particular way. There is really no cause to be secretive, and this applies especially the chemical industry.

* * *

During the past six years the National Safety Council in the United States has compiled reports from the chemical industry in which 1120 serious injuries and disabilities are noted. From a study of these reports the conclusion is drawn that injuries in the chemical industry arise mostly from the same causes as in other industries. Of the 274 cases of serious injury, 36 per cent. were caused by machinery and plant equipment. Presses and crushing rolls were the outstanding offenders, followed by pumps, fans, and mixers. Pipe-lines and tanks were responsible for about 6 per cent. of the accidents, but a greater percentage in respect of severity of the injury. Less than 10 per cent. of the accidents comprised injuries actually due to chemicals. Purely mechanical causes were assigned to 80 per cent. of all serious injuries. Personal causes, such as the ignoring of instructions, diverted attention, recklessness and the like, were indicated in half the individual cases studied.

* * *

Loose parts of clothing are a danger near moving machinery; even smooth shafting, despite its innocent appearance, can be as dangerous as gear wheels. Guards are placed round some machinery because experience has shown that there is need for it—because the moving parts are within easy reach of persons passing or persons in attendance upon the machine. But whether or not there are guards, let it be borne in mind that all machinery must be treated with respect. Some machinery is unguarded because it is normally out of reach; no person unauthorised has any right to be within reach of it, as in the case of overhead shafting with pulleys driving other machinery that is properly guarded below. The attention of anyone working adjacent to moving machinery must not be distracted. When more than one person is present in attendance or in the immediate vicinity, machinery must never be started without due warning, and also assurance to the person authorised to start it that there is nobody remaining in an unsafe position. When a machine needs adjustment the power must be shut off in such a way that it cannot start itself, or be started accidentally or by any person in ignorance of the consequences.

* * *

The moving of drums at chemical works, and in industries using chemicals, is attended by some danger to those who are ignorant of the nature of the contents. Many liquids are either inflammable, corrosive, or poisonous. Even if a drum is empty it is wise to assume that it is dangerous, unless it is known definitely that the liquid last contained in it was harmless. It is also well to remember that there are right and wrong ways of handling drums, if crushed fingers are to be avoided. Safety Instruction Card No. 132, which is one of 500 different cards issued by the National Safety Council in the United States, shows how to accomplish this safely and efficiently. Greater attention to such things as these will help to reduce the number of accidents at works and avoid lost time and compensation for injuries.

British Association of Chemists

Increase of Unemployment Insurance

AT a recent meeting of the Unemployment Special Purposes Committee, it was decided that the rate of unemployment insurance to members should be increased as from March 1, 1941, from 17s. 6d. per week per unit to £1 per week per unit. Additionally, the bonus of 2s. 6d. per week will be paid to those subscribers who are qualified for this bonus. The committee has always wished to restore this basic rate of benefit. This has been made possible now that the reserves of the fund have reached £22,500. Unemployment insurance has had a decisive effect upon the economic status of the chemist. It has enabled him to negotiate for an adequate salary appropriate to his status.

LETTERS TO THE EDITOR

" Thiokol "

SIR,—Our attention is drawn to the reference to " Thiokol " being manufactured by Dow, in an article headed " The Influence of Synthetic Rubbers on Plastics," published in your February 22 issue.

As sole European representative of the Thiokol Corporation, 780, North Clinton Avenue, Trenton, New Jersey, we feel it desirable to emphasise the fact that it is the Thiokol Corporation that is responsible for the sales and development of " Thiokol " products, and that while at the moment actual manufacture may be carried out by Dow, the latter would, in our opinion, have no wish for readers to assume that they alone are responsible for " Thiokol " manufacture.

We feel that this comment of ours is all the more necessary inasmuch as in the article in question there is no mention at all of the Thiokol Corporation.—Yours truly,

MONSANTO CHEMICALS, LIMITED.
Ruabon. A. D. DAYSH,
March 5, 1941. Director.

SIR,—Credit where credit is due. I would not wish to create any false impression concerning the development of thiokol. I gladly salute the Thiokol Corporation for one of the most outstanding contributions to chemical industry. They have opened up an entirely new field of activity and the value of their work cannot be over-emphasised.

Thiokol was discovered by Dr. J. C. Patrick in the early nineteen-twenties. As a result the Thiokol Corporation was formed and carried out all the pioneer work which has resulted in the excellent products with which industry is now fully acquainted. Comparatively recently the Dow Chemical Company acquired an interest and took over the large scale manufacture of the material. There is no shadow of doubt whatever that the credit for developing Thiokol and bringing it to its present state of excellence is due almost entirely to the Thiokol Corporation of New Jersey.

It is, of course, wrong that the Dow Company should seemingly get the credit for Thiokol. In attributing it to Dow, I was merely following current American practice, which in view of space limitations seemed satisfactory. How unjust this is can be appreciated from the fact that before Dow's took over, no less a person than President Roosevelt stated that Thiokol was of outstanding national importance to the United States.

This matter does raise an interesting point. In recent years there has been a remarkable degree of integration among plastic concerns in the United States. The tendency has resulted in the building up of a few very large manufacturing combinations. The leading groups include Du Ponts, Monsanto, Dow, Union Carbide and Carbon, etc. For example, even the Bakelite Corporation is now merely a unit of Union Carbide and Carbon Corporation. Almost inevitably where concerns are absorbed, there must be some loss of identity, and credit for earlier achievement is consequently often misapplied.—Yours faithfully,

Southampton. HARRY BARRON.
March 11, 1941.

Chemical Matters in Parliament

Tin Prices

IN the House of Commons last week, Mr. Ellis Smith asked the Minister of Supply what was the price per ton of tin in 1936, 1940, in January and February, 1941, respectively; and whether steps had been taken to safeguard the supplies required, and at what price.

Sir Andrew Duncan, replying, said that the mean average price per ton of cash standard tin on the London Metal Exchange was £204 12s. 8d. in 1936, £256 12s. 3d. in 1940, £256 15s. 10d. in January, 1941, and £265 3s. 11d. in February, 1941. The hon. Member could rest assured that the necessary steps had been taken to safeguard the supply position in this country. Purchases on Government account had been made from time to time at varying prices, but it would not be in the national interest to publish the quantity or the cost.

Luminous Paint

Mr. Sorensen asked the Home Secretary whether the committee inquiring into the possible value of phosphorescent, luminous and similar paints and objects had completed its task; and whether the committee's recommendations were favourable and were being carried into effect.

Mr. Mabane answered that he understood the committee's report was in draft and that the Minister would be receiving it shortly. In reply to further questions he explained that the report would not be published, and that Members would not be given the opportunity of seeing it.

Patriotism and Savings

Sir Ernest Benn on " Cheap Money "

SIR ERNEST BENN, the chief proprietor of THE CHEMICAL AGE, makes some trenchant remarks on patriotism and savings in his annual statement to the members of the United Kingdom Provident Institution, of which he is chairman. He says:—

" In every speech that I have made to our members I have protested against the folly and injustice of the ' cheap money ' policy. ' Cheap money ' has achieved none of the purposes in mind when the policy was inaugurated. For instance, it failed altogether to stimulate trade. The injustice of ' cheap money ' is seen very clearly by a glance at the war figures. One per cent. added to the rate of interest on new borrowings would have cost the nation in 1940 something in the neighbourhood of £20,000,000 gross. Since the war more than ten times that sum has been added to our wages bill. Thus the spenders have been encouraged and the savers discouraged at the very moment when it is vital that we should all spend less and save more. I mention wages only because the figures are available, but nobody doubts that if, in the hurry and excitement of battle, we had been able to pay proper attention to economy, £20,000,000 a year could have been secured out of all the extravagance which surrounds us. I have no desire to open all the controversial questions which these figures suggest, but as the savers now outnumber the wage-earners some of the old arguments may need reconsideration. Just as it is necessary to make it worth while to work, so it is also necessary to make it worth while to save. An accepted policy which coupled good wages with a more general recognition of the virtue and value of thrift for its own sake would lift us all on to a higher and safer economic level.

" The accumulation of capital by the wage-earners in the last few decades is perhaps the best of all the social improvements of our time. The opportunity now presents itself rapidly to accelerate that healthy process and, by so doing, to make both past and present savings safe. In this way the war gives an opportunity for a social revolution second in importance only to the winning of the war itself.

" It was at one time said, by some people with derision, by others with pride, that patriotism and 5 per cent. went together. Lord Kindersley has shown that patriotism and 2½ per cent. can go a very long way together, or, indeed that patriotism of itself is in same cases enough for the moment. We have witnessed the most wonderful display of the qualities of the voluntary principle in the National Savings Campaign. It should be noted, however, that the success so far achieved has been based upon patriotism, and that self-interest has been almost left out of account. It must remain a matter of conjecture whether, if Lord Kindersley had, as in the last war, been able to offer reasonable investment terms, the results of his campaign might not have been sufficient to close completely the dangerous gap between revenue and spending, and to rid us safely of the horrid bogy of inflation.

New Control Orders

Raw Rubber and Carbon Black

THE Board of Trade announces that the Open General Licence permitting the import of carbon black from natural gas or acetylene from any country has been revoked from March 13. Individual import licences will not, however, be required for consignments of the above material which can be shown to the satisfaction of the Commissioners of Customs and Excise to have been despatched to the United Kingdom before March 13, and which are imported into this country before May 13 next. Also from March 13 the Open General Licence for raw rubber is amended to include crêpe. The wording now reads "Rubber, raw, including crêpe; rubber latex; raw gutta percha and balata; but not including reclaimed and waste rubber." Applications for import licences for carbon black should be addressed to the Import Licensing Department.

Sulphuric Acid

The Treasury has issued the Sulphuric Acid (Charges) (No. 1) Order, 1941, which directs that a payment of 6s. 4d. per ton of sulphuric acid (70 per cent. basis) shall be made to the Minister of Supply (or as he may direct) in respect of all acid produced in the United Kingdom. The sum obtained will be used to meet increased cost of freights on imported raw materials, any abnormal costs of distribution of acid, and other contingencies.

The Order, together with Direction No. 2 under the Control of Sulphuric Acid (No. 2) Order, 1940, came into effect on March 10. Inquiries should be addressed to the Controller of Sulphuric Acid, Ministry of Supply, 19 Berkeley Square, Bristol, 8.

Aluminium and Starch Export Prohibited

Under a Board of Trade Order (S.R. and O. 1941, No. 308) which comes into force on March 27, 1941, the exportation of aluminium hollow-ware is controlled to all destinations, but applications for export licences will not, normally, be entertained. Where stocks are held by persons registered under the Limitation of Supplies (Miscellaneous) Orders, the Ministry of Aircraft Production are prepared to purchase such stocks at cost.

The exportation of starches, waxes, and certain chemicals is also controlled to all destinations, and control is imposed on the exportation of casein and certain additional metal ores but, in these cases, to certain destinations only.

Personal Notes

MR. A. D. POWELL was elected chairman at the annual meeting of the Nottingham Section of the Society of Chemical Industry, held at the Welbeck Hotel on March 8.

DR. DAVID D. HOWAT, of the Royal Technical College, Glasgow, has been "lent" by the College to the Ministry of Supply, to act as Control Metallurgist at a Royal Ordnance Factory.

MR. A. PINKERTON, immediate past-president, was awarded the President's Medal of the Birmingham Metallurgical Society at its meeting on March 8; and DR. H. W. BROWNSDON was presented with a table barometer in recognition of his services to the Society.

MR. N. R. REES, of Walton, Chesterfield, is to succeed the late Mr. J. B. Allan as Foundries General Manager to the Staveley Coal and Iron Co., Ltd. For the past few years he has been technical adviser to the company's foundry department.

DR. THOMAS MORAN, director of the Flour Millers' Research Association, was presented with the medal of the Liverpool University Chemical Society at a meeting of the Society on March 5, the presentation being made by the president, Mr. Stanley Beaumont. Dr. Moran afterwards gave a talk entitled "Random Thoughts on Science and Industry."

The King has approved the award of George Medals to DAVID EWINGTON BARNES, Scientific Officer, Ministry of Supply; LEONARD WALDEN, Temporary Experimental Assistant II, Admiralty; and WILLIAM JAMES WILTSHIRE, Senior Scientific Officer, Ministry of Supply, "for conspicuous gallantry in carrying out hazardous work in a very brave manner."

DR. W. HOOK, who addressed a meeting of the Society of Chemical Industry at the Royal Turks' Head Hotel, Newcastle, on Thursday, on the subject of "Gravity Coal Cleaning with Special Reference to the Barvoys Process," is chief chemist to the Charlow and Sacriston Collieries Co., Ltd. In association with Mr. E. M. Myers, he brought into operation one of the most complete coal cleaning and preparation plants in the North of England.

PROFESSOR C. H. BROWNING, F.R.S., who delivered the 49th Bedson Lecture in the Chemistry Theatre, King's College, Newcastle, on Tuesday, chose "Landmarks in Chemotherapy" as his subject. Dr. Browning is Gardiner Professor of Bacteriology in the University of Glasgow, and his previous appointments include that of official assistant to Professor Ehrlich and Frankfurt-on-Main and Professor of Bacteriology in the University of London.

OBITUARY

MR. WILLIAM GRANTLEY HYDE, who died at Tunbridge Wells on February 26, aged 72, was a senior director of May and Baker, Ltd., Dagenham.

MR. GEORGE WILFRID CLARK, who died at Blackpool on March 9, aged 57, was a member of the firm of George Clark (Sheffield), Ltd., North British Steel Works, Sheffield.

MR. JAMES PINKERTON GILMOUR, formerly editor of the *Pharmaceutical Journal* and chairman of the Rationalist Press Association died at Highgate, N.6, on March 10.

Synthetic Phenol

Non-Catalytic Process

IN spite of the well-established fact that most reactions involving oxidation or reduction of ring compounds give improved yields in the presence of metallic or other catalysts and promoting agents, the oxidation of benzene to phenol is now reported to take place more efficiently in the absence of any catalyst. A process for the vapour-phase oxidation of benzene at high temperatures and pressures has been evolved by Moyer and Klingelhoefer (U.S.P. 2,223,383; Solvay Process Co.), who claim that higher yields are obtained in the entire absence of catalysts than in the presence of nitrogen oxides. The reaction chamber in their process is lined with a non-porous surface such as vitrified brick, fused silica or fused alumina. Synthetic phenol is now produced on a large scale in the United States, but the process employed is based on intermediate formation of monochlorobenzene (Raschig process), the latter being converted into phenol by a catalytic reaction.

JAPANESE ACTIVATED CLAY

The acid clay which is widely distributed in Northern Japan is used on a considerable scale as an adsorbent and decolorising agent. K. Yamamoto (*J. Soc. Chem. Ind. Japan*, Oct. 1940, 303B) mentions its application to the removal of sulphur compounds from gases and solvents, oil refining and the isolation of vitamins and alkaloids. As a catalyst it is used in the production of ethylene from ethyl alcohol, petrol from heavy oils, and resins from cracked oils. Preparation of the material for technical use involves crushing the raw acid clay into lumps, which are dried in iron pans over an open fire when a 40 per cent. loss in weight occurs by moisture evaporation. The dry powder is finally sifted through a 100 mesh per sq. cm. silk sieve.

A Chemist's Bookshelf

INDUSTRIAL ELECTROCHEMISTRY. By C. L. Mantell, Ph.D., London: McGraw-Hill. Pp. 650. 38s.

This new volume in the chemical engineering series deals with electrochemical practice as a branch of chemical engineering and not as a subdivision of physical chemistry where it has too often been given a minor place. The commercial importance and magnitude of the industries commonly classified as electrochemical have not been sufficiently appreciated; the value of these industries and their products to our daily life is too often ignored. Moreover, the technical literature on this subject has until now been mainly foreign (mostly German) and this book, which goes deeply into the details of the subject will be all the more welcome on that account to English-speaking people.

The text is divided into six parts. The first deals with theoretical electrochemistry, its units and laws, the principles of conductance, dissociation, polarisation, etc.; the second part concerns technical electrochemistry, starting with electrochemical analysis and describing electrolytic reduction and oxidation, the cells employed, and the connections with colloid chemistry. The third part treats of metal deposition, electroplating, electroforming, electrorefining and electrowinning of metals, also of the electrolysis of alkali halides, fused salts, hydrogen and oxygen. Part four is devoted to electrothermal technique in general, electric furnaces, ferro alloys, calcium carbide, cyanamide and various non-metallic electrothermal products. Part five deals with the electrochemistry of gases and part six with engineering problems, materials of construction, power generation, and economics.

The contents of the book are so comprehensive that it amounts practically to an encyclopædia of its specialised subject. A mass of tables, diagrams, and references in the text, as well as many illustrations supplied by the competent industries, are an encouraging proof of the co-operation of men and organisations engaged in electrochemical technology. This volume will not only be of great value to scientists, but will serve also as a work of reference for the chemical industries in general.

FACTORY TRAINING MANUAL. Ed. by Reginald Pugh. Bath: Management Publications, Ltd. Pp. 286. 5s.

Though primarily of interest from the mechanical engineering standpoint, this admirable and closely-packed manual of factory practice in all its aspects is a most timely publication. In these days when unskilled personnel is, by force of necessity, being rapidly absorbed into factory conditions, a sympathetic and informed attitude to the new worker, full of "amazement and bewilderment at his first contact with the unfamiliar surroundings," is an essential towards the fulfilment of the national effort. As Mr. Bevin says, in a short foreword, training is the key to that stupendous acceleration of production which is needed to ensure certain victory.

The book is a remarkable piece of team work by a group of engineers employed by the British Thomson-Houston Co., Ltd., all of whom prefer to remain anonymous. Metallurgists will be particularly interested in the succinct but adequate chapters dealing with the heat treatment of metals and with welding; while the last chapter, treating of the human element, is of importance to every employer of labour. Incidentally it shows a knowledge of the principles laid down by the National Institute of Industrial Psychology, no bad indication of the up-to-dateness of the manual as a whole. The book is copiously illustrated with excellent diagrams and photographs of apparatus, and the whole work can fairly be described as a real and practical aid towards the national effort. It will be of value to every executive on the industrial front.

A TEXT BOOK OF QUALITATIVE CHEMICAL ANALYSIS. 2nd ed. By Arthur I. Vogel. London: Longmans. Pp. 486. 10s. 6d.

The success, well deserved, of the first edition of this text book (reviewed in THE CHEMICAL AGE, 1938, *38*, 977, p. 227) has encouraged author and publishers to produce a new edition in the light of subsequent knowledge. The new edition is over 100 pages longer and the three shillings' increase in price is very moderate. The seven main sections of the original edition have been maintained and the necessary additions have been included in their systematic positions. Most important of the new sections are a discussion of the colloidal state (Chap. I); a detailed account of micro-qualitative analysis (Chap. II), including spot tests, which is particularly desirable in view of the rapid advances in this field; and new tables and other data concerning the reactions of some of the rarer elements (Chap. VII). It is interesting to note, among the author's acknowledgments, that most of the new diagrams were prepared by A. Gallenkamp and Co., Ltd. Mr. K. Burrow, A.I.C., checked many of the new tests, and the notes on analytical reagents provided by British Drug Houses, Ltd., and Hopkin and Williams, Ltd., were among the authorities consulted.

ANNUAL REPORT OF THE SMITHSONIAN INSTITUTION, 1939. Washington: U.S. Government Printing Office. Pp. 567. $1.50.

The usual staggering variety of topics of scientific research is covered by this monumental and finely-produced report. All knowledge is the province of the Smithsonian, and the chemist's principal interest in the report will be the discovery of what is being done in other scientific fields. More immediately interesting, however, is the article, by Dr. George Harrison, on "Spectroscopy in Industry," a brief but comprehensive review of the methods by which spectroscopic instruments have aided the metallurgical and chemical process industries; but other articles in the "General Appendix" (as the major part of the report is modestly entitled) range from a consideration, by the Astronomer Royal, of the possibility of life in other words, to detailed circumstantial accounts of excavations in Kurdistan and the use of soapstone by American Indians.

U.S. Sulphur Production

Some Figures of the Industry

THE sulphur industry in the United States produced 2,091,000 long tons of sulphur with a mine value of about $32,000,000, according to preliminary figures for 1939 recently released by the Director of the Census. The United States ranks as the foremost producer of sulphur in the world, the amount produced in 1939 accounting for over 80 per cent. of the estimated world output. Large domestic reserves of sulphur and a large production capacity assure an ample supply to meet any expanded demand in the near future.

Mine operations that produced native sulphur in 1939 employed an average of 1500 wage-earners and about 500 salaried workers. The amount paid to wage-earners was $2,528,000 and to salaried employees, $1,911,000. Wage-earners at sulphur mines worked a total of nearly 3,000,000 man-hours during the year and were paid an average of 84 cents per man-hour. The output of sulphur per man-hour was 0.7 long ton.

Over 99 per cent. of the native sulphur produced in 1939 was obtained from six operations—one in Louisiana and five in Texas. This sulphur was recovered by the Frasch continuous process, in which wells are drilled into the underground sulphur deposits, casing is inserted, and large quantities of superheated water are pumped underground. The resulting molten sulphur is raised to the surface by means of compressed air and allowed to cool and solidify in large bins. The product so obtained is practically pure.

The sulphur industry is a large consumer of fuel, and its expenditures for fuel in 1939, principally for natural gas, were $1,128,000, representing 15 per cent. of the reported principal expenses. The total power rating of prime movers and of electric motors driven by purchased electric energy was about 45,000 h.p. Of the electric energy consumed by the industry, about 13 kWh were consumed per ton of sulphur produced.

General News

A CHART OF WAR GASES, their nature, effects and first-aid treatment, has been issued by the Ministry of Home Security, price 2d. each (post free, 3d.), or 25 for 3s. (3s. 6d.).

THE MINISTRY OF AIRCRAFT PRODUCTION has issued specifications (Nos. D.T.D. 411 and D.T.D. 449) for rubber hose for use with ethylene glycol and for silicate paint for timber (price 1s., post free 1s. 1d., and 6d., post free 7d., respectively).

AT A CONFERENCE held on March 7, the following increases in wages were arranged for tubeworkers in Scotland: men, 3s. per week; youths under 21, 1s. 6d. per week; boys under 18, 1s. per week. Advances take effect from the week beginning March 3. The increases apply to over 4000 workmen.

THE TRADING WITH THE ENEMY (Specified Persons) (Amendment) (No. 3) Order, 1941, contains a number of additions to and a few deletions from the previous lists of persons and firms in neutral countries with whom trading is illegal, and includes the Gesellschaft für Metallo-chemische Interessen, Bahnhofstrasse 5, Zurich, Switzerland.

THE MINISTRY OF FOOD wishes to compile a register of all drying plants available for the treatment of salvaged foodstuffs. Any owner of such a plant, who has not received a questionnaire form from the Ministry, is asked to communicate with the Emergency Services Division, Colwyn Bay Hotel, Colwyn Bay, Denbighshire. He should give the address of his plant or plants.

NOTICE No. 78 (Goods Chargeable with Purchase Tax) issued by the Commissioners of Customs and Excise is being revised and reprinted, and copies of the new edition will shortly be sent to all registered traders. The revised Notice supersedes Notice No. 78, dated September, 1940, and other decisions on the liability of tax of particular classes of goods, which have been issued to the Press from time to time.

THE CEMENT AND STEEL TESTING PRACTICE carried on by the late Mr. E. W. Monkhouse, M.I.Mech.E., has been acquired by Messrs. E. F. Mactaggart, B.Sc., A.R.C.S., and W. E. Evans, B.Sc., A.R.C.S., A.I.C., consulting chemical engineers, who propose to run the business in conjunction with their existing analytical and consulting practice at 14, Old Queen Street, S.W.1.

DELIVERING THE PRESIDENTIAL ADDRESS to the Birmingham Metallurgical Society last Saturday, Mr. C. H. H. Franklin spoke of "Industrial Progress—Whither and Why." "Metallurgical progress," he said, "has placed at our disposal materials that are as resistant to corrosion by foodstuffs, etc., as gold and silver . . . and have much finer mechanical properties." He urged metallurgists to study what metals are best suited for food-containers; the study of the facts of food contamination was well within the metallurgist's domain, though he suspected that over-cooking and over purifying were more frequent causes of ill-health than direct metallic salt contamination.

Foreign News

UNITED STATES IRON AND STEEL EXPORTS in 1940, 7,785,540 gross tons valued at $476,351,104, were larger by nearly 25 per cent. than in any previous year.

THE FIRST ELECTRON MICROSCOPE in America to be put to commercial use is now in operation in the laboratories of the American Cyanamid Co., Stamford, Conn. It is being used to enable the company's research workers to develop new chemicals for industry and medicine. Work has already been done in the study of pigments for the paper industry.

AN AGREEMENT HAS BEEN SIGNED which provides for the transfer by Japanese military authorities to the "provincial government" at Canton, of nine industrial enterprises in Canton and vicinity, which have been under Japanese control since 1938. These include a large fertiliser plant and sulphuric acid and caustic soda works.

IMPORTS OF CASTOR BEANS into the United States in 1940 were nearly half again as large as those of 1939. India accounted for the bulk of this increase, receipts from Brazil remaining on about the same level as in 1939. The gain in castor bean imports was due chiefly to expanded use of dehydrated castor oil in the paint and varnish industry to supplement inadequate supplies of tung oil.

From Week to Week

METHANOL AND ACETIC ACID are to be produced as by-products in a charcoal plant, which is being built near Pitea (Northern Sweden) and will cost 1,500,000 kronor. The plant is to be completed by June and the retorts will have a capacity of 150,000 cubic metres of wood charcoal per annum.

THE HUNGARIAN PAPER INDUSTRY is reported, by *Foreign Commerce Weekly*, to be experimenting with the use of leather scraps and waste in the manufacture of leatherboard and artificial leather. A product already developed is said to be strong and water-resistant, and similar to leather in many respects. Pressed very thin, it is said to produce a paper superior in durability and ability to wood-pulp papers.

SODIUM THIOCYANATE as a means of prolonging life was suggested by Dr. W. M. Malisoff, Professor of Biochemistry, Brooklyn Polytechnic Institute, at a recent meeting of the Huntington Executive Club. According to an Associated Press message, he claims to have been able to "reverse the symptoms of old age" in experiments with NaCNS on some fifty rabbits, and draws the conclusion that it may become possible to increase human life-span to 185 years.

EXPORTS OF CHEMICALS and allied products from the United States were valued at $256,000,000 in 1940—an increase of 29 per cent. over the 1939 total. Large gains were recorded in explosives, coal tar and industrial chemicals, the advance in price of certain products being partly responsible for the large increase in the totals for the two latter groups. In the explosives group shipments of smokeless powder were several times the 1939 figure, says *Foreign Commerce Weekly*, but dynamite exports showed no striking change. Sodium cyanide, the sodium chromates, and the sulphates of ammonia and copper showed large increases.

THE PRODUCTION OF LÆVULINIC ACID on a commercial scale (for the first time in March, 1940) by the A. E. Staley Mfg. Co., of Decatur, Illinois, has led that company to produce a useful file of references to the literature on that material. The references are extensive, and are carefully divided under various headings. Lævulinic acid may be purchased in quantities from 1 lb. to 1 ton. The technical acid ranges in price from 30 to 50 cents f.o.b. (according to quantity) for 98-99 per cent. acid (10 per cent. less for 90 per cent. acid), while the chemically pure grade, which is still manufactured on a laboratory basis only, costs $5 per lb. Increases in demand will effect a material lowering of these prices.

Forthcoming Events

A MEETING OF THE YORKSHIRE SECTION, Society of Chemical Industry, will be held on March 17, at 6 p.m., in the Chemistry Lecture Theatre, The University, Leeds, when Mr. E. C. W. Smith, B.Sc., will discuss "The Radiation of Solids under Flame Impact."

A MEETING OF THE INSTITUTE OF CHEMISTRY will be held in the Royal Institution at 2.30 p.m., on March 19, jointly with the London and Home Counties Branch of the Institute of Physics, when Dr. J. J. Fox, C.B., O.B.E., Government chemist and president of the Institute of Chemistry, will read a paper on "Infra-Red Absorption and Molecular Structure."

AT A MEETING of the Royal Society on March 20 at 2.45 p.m., papers will be read by Mr. G. E. Briggs, F.R.S., on "Photosynthesis in Intermittent Illumination," and by Messrs. E. C. Bullard and T. F. Gaskell on "Submarine Seismic Investigations." An election of Fellows will be held at 4 p.m.

THE SCOTTISH SECTION of the Oil and Colour Chemists' Association is holding a joint meeting with the Society of Dyers and Colourists at the Grosvenor Restaurant, Glasgow, on March 21, at 7 p.m. Mr. James Bruce will present a paper entitled "Vital Developments from the Dyestuffs Industry."

A JOINT MEETING OF THE SOUTH YORKSHIRE SECTION, Institute of Chemistry, and the Yorkshire Section, Society of Chemical Industry, will be held on March 25, at 6.30 p.m., at the Technical College, Rotherham. Mr. A. W. Chapman, D.Sc., F.I.C., will lecture on "Some Aspects of Boiler Water Treatment."

Weekly Prices of British Chemical Products

VALUES continue on a firm basis in all sections of the general chemical market and there are few price alterations of importance to be recorded. So far as business is concerned there is no slackening in demand and offers of most of the industrial chemicals find a ready market and makers' deliveries against forward bookings are good. In the potash section the demand is in excess of supplies and amongst the soda compounds the active items include nitrate, perborate, sulphide, bicarbonate, and prussiate. There is a persistent demand for available supplies of the potash materials. Trade in the market for coal tar products has followed an even trend this week and values in all directions continue to be well held, there being no outstanding price movements to record.

MANCHESTER.—Although not much in the way of actual further price changes has occurred on the Manchester chemical market during the past week the tendency in virtually all sections is very strong and fresh advances in a number of directions would not be surprising. Inquiry from home users this week has been on quietly steady lines, whilst a moderate business has been placed for export. Most home trade users are taking good contract deliveries. The light materials continue to be the most active sections of the tar products market, though fairly brisk trading conditions have been reported also in crude tar, creosote oil, and crude carbolic acid.

GLASGOW.—Business in general chemicals for home trade has been rather quiet during the week, and export business has also been somewhat limited. Prices generally continue very firm at about previous figures, and where changed are rather dearer, chrometan crystals having been increased ¾d. per lb. and liquor £3 10s. per ton.

Price Changes

Rises: Acetic Acid, Acetone, Arsenic Sulphide, Creosote, India Rubber Substitutes, Methylated Spirit, Naphthalene, Sodium Nitrate, Sodium Perborate, Sodium Prussiate, Sodium Sulphide, Vegetable Lamp Black.

Falls: Antimony Sulphide, Cadmium Sulphide, Carbolic Acid, Mercury Products, Sulphur.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton £39 10s.; 10 cwt./1 ton, £40 10s., 4/10 cwt., £41 10s.; 80% pure, 1 ton, £41 10s.; 10 cwt./1 ton, £42 10s.; 4/10 cwt., £43 10s.; commercial glacial, 1 ton, £49; 10 cwt./1 ton, £50; 4/10 cwt., £51; delivered buyers' premises in returnable barrels, £4 10s. per ton extra if packed and delivered in glass.

Acetone.—Maximum prices per ton, 50 tons and over, £65; 10/50 tons, £65 10s.; 5/10 tons, £66; 1/5 tons, £66 10s.; single drums, £67 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alum.—Loose lump, £9 10s. per ton, d/d, nominal.

Aluminium Sulphate.—£8 to £8 10s. per ton d/d.

Ammonia Anhydrous.—1s. 7d. to 2s. 2d. per lb.

Ammonium Carbonate.—£39 to £40 per ton d/d in 5 cwt. casks.

Ammonium Chloride.—Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £19 10s. per ton. MANCHESTER: Grey galvanising, £22 10s. per ton. See also Salammoniac.

Antimony Oxide.—£68 per ton.

Arsenic.—99/100%, about £31 10s. per ton, ex store.

Barium Chloride.—98/100%, prime white crystals, £11 10s. to £13 per ton, bag packing, ex works; imported material would be dearer.

Bleaching Powder.—Spot, 35/37%, £10 7s. 6d. per ton in casks, special terms for contract.

Borax, Commercial.—Granulated, £26; crystals, £27; powdered, £27 10s.; extra fine powder, £28 10s.; B.P. crystals, £35; powdered, £35 10s.; extra fine, £36 10s. per ton for ton lots, in free 1-cwt. bags, carriage paid in Great Britain. Borax Glass, lump, £73; powder, £74 per ton in tin-lined cases for home trade only, packages free, carriage paid.

Boric Acid.—Commercial, granulated, £42 10s.; crystals, £43 10s.; powdered, £44 10s.; extra fine powder, £46 10s.; large flakes, £55; B.P. crystals, £51 10s.; powdered, £52 10s.; extra fine powdered, £54 10s. per ton for ton lots in free 1-cwt. bags, carriage paid in Great Britain.

Calcium Bisulphite.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £5 15s. per ton ex store.

Charcoal Lump.—£10 10s. to £14 per ton, ex wharf. Granulated, supplies scarce.

Chlorine, Liquid.—£21 7s. 6d. per ton, d/d in 16/17 cwt. drums (3-drum lots); 5½d. per lb. d/d station in single 70-lb. cylinders.

Chrometan.—Crystals, 4½d. per lb.; liquor, £19 10s. per ton d/d station in drums. GLASGOW: Crystals 4¾d. per lb. in original barrels.

Chromic Acid.—1s. 2d. per lb., less 2½%; d/d U.K. GLASGOW: 1s. 0½d. per lb. for 1 cwt. lots.

Citric Acid.—1s. 2d. per lb. MANCHESTER: 1s. 6d.

Copper Sulphate.—About £29 10s. per ton f.o.b. MANCHESTER: £28 10s., less 2 %, in 5 cwt. casks f.o.b. Liverpool.

Cream of Tartar.—100%, £10 2s. per cwt., less 2½%, d/d in sellers' returnable casks.

Formaldehyde.—£21 15s. to £25 per ton d/d. MANCHESTER: 40%, £22 to £25 per ton in casks d/d; imported material dearer.

Formic Acid.—85%, £47 per ton for ton lots, carriage paid, carboys returnable; smaller parcels quoted up to 50s. per cwt., ex store.

Glycerine.—Chemically pure, double distilled 1260 s.g., in tins, £3 15s. to £4 15s. per cwt., according to quantity; in drums, £3 7s. 6d. to £4 1s. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 6s. 1½d. to 8s. 7½d. carboy d/d according to purity, strength and locality.

Iodine.—Resublimed B.P., 9s. 2d. to 13s. per lb., according to quantity.

Lactic Acid.—Dark tech., 50% by vol., £31 per ton; 50% by weight, £38; 80% by weight, £67; pale tech., 50% by vol., £39 10s.; 50% by weight, £46, 80% by weight, £74. Not less than one ton lots ex works; barrels returnable, carriage paid.

Lead Acetate.—White, £46 10s. to £48 10s. ton lots. MANCHESTER: £46 to £48 per ton.

Lead Nitrate.—About £45 10s. per ton d/d in casks.

Lead, Red.—English, 5/10 cwt. £42; 10 cwt. to 1 ton, £41 15s.; 1/2 tons, £41 10s.; 2/5 tons, £41; 5/20 tons, £40 10s.; 20/100 tons, £40; over 100 tons, £39 10s. per ton, less 2½ per cent. carriage paid; non-setting red lead 10s. per ton dearer in each case. Continental material £1 per ton cheaper.

Lead, White.—Dry English, less than 5 tons, £53 10s.; 5/15 tons, £49 10s.; 15/25 tons, £49; 25/50 tons, £48 10s.; 50/200 tons, £48 per ton less 5 per cent. carriage paid; Continental material £1 per ton cheaper. Ground in oil, English, 1/5 cwt., £62; 5/10 cwt., £61; 10 cwt. to 1 ton, £60 10s.; 1/2 tons, £59; 2/5 tons, £58; 5/10 tons, £56; 10/15 tons, £55; 15/25 tons, £54 10s.; 25/50 tons, £54; 50/100 tons, £53 10s. per ton less 5 per cent., carriage paid. Continental material £2 per ton cheaper.

Litharge.—1 to 2 tons, £41 10s. per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £14 to £17 per ton

Magnesium Chloride.—Solid (ex wharf), £12 to £13 per ton. MANCHESTER: £13 to £14 per ton.

Magnesium Sulphate.—Commercial, £10 to £12 per ton, according to quality, ex works.

Mercury Products.—Controlled price for 1 cwt. quantities: Bichloride powder, 11s. 7d.; bichloride lump, 12s. 2d.; ammon. chloride powder, 13s. 5d.; ammon. chloride lump, 14s.; mercurous chloride, 13s. 9d.; mercury oxide, red cryst., B.P., 15s.; red levig. B.P., 15s. 6d.; yellow levig. B.P., 14s. 9d.; yellow red, 14s. 4d.; sulphide, red, 12s. 11d.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 2s. 0½d. per gal.; pyridinised 64° O.P. 100 gals., 2s. 5d. per gal.

Nitric Acid.—£22 to £30 per ton ex works.

Oxalic Acid.—From £60 per ton for ton lots, carriage paid, in 5-cwt. casks; smaller parcels would be dearer; deliveries slow.

Paraffin Wax.—Nominal.

Potash, Caustic.—Basic price for 50-100 ton lots. Solid, 88/92%, commercial grade, £53 15s. per ton, c.i.f. U.K. port, duty paid. Broken, £5 extra; flake, £7 10s. extra; powder, £10 extra per ton. Ex store, £3 10s. supplement.

Potassium Bichromate.—Crystals and cranular 7d. per lb.; ground 7d. per lb., carriage paid. MANCHESTER and GLASGOW: 7d. per lb. in orig. casks.

Potassium Carbonate.—Basic prices for 50 to 100 ton lots; hydrated, 83/85%, £46 17s. 6d. per ton; calcined, 98/100%, £52 10s. per ton, c.i.f. U.K. port. Ex warehouse, £3 10s. extra per ton.

Potassium Chlorate.—Imported powder and crystals, ex store London, 10d. to 1s. per lb.

Potassium Iodide.—B.P., 8s. to 11s. 2d. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, £26 to £30 per ton ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 5½d. per lb. for 1 cwt. lots; commercial, £7 9s. 6d. to £8 1s. 6d. per cwt., according to quantity d/d.

Potassium Prussiate.—Yellow, about 1s. 3d. to 1s. 5d. per lb., supplies scarce.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £19 10s. per ton, in casks, ex store.

Soda, Caustic.—Solid, 76/77% spot, £14 17s. 6d. per ton d/d station.

Soda Crystals.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

Sodium Acetate.—£37 to £40 per ton, ex wharf.

Sodium Bicarbonate (refined).—Spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 5⅜d. per lb., anhydrous, 6d. per lb. net d/d U.K. MANCHESTER and GLASGOW: 5⅜d. per lb., in orig. casks.

Sodium Bisulphite Powder.—60/62%, £17 10s. per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.

Sodium Chlorate.—£36 to £45 per ton, d/d, according to quantity.

Sodium Hyposulphite.—Pea crystals, £19 15s. per ton for 2-ton lots; commercial, £14 10s. per ton. MANCHESTER: Commercial, £14 10s.; photographic, £19 15s.

Sodium Iodide.—B.P., for not less than 28 lb., 8s. 10d. per lb.; for not less than 7 lb., 10s. 9d. per lb.

Sodium Metasilicate.—£14 5s. per ton, d/d U.K. in cwt. bags.

Sodium Nitrate.—Refined, £13 10s. per ton for 2-ton lots d/d

Sodium Nitrite.—£22 to £23 per ton for ton lots.

Sodium Perborate.—10%, £5 2s. per cwt.

Sodium Phosphate.—Di-sodium, £19 to £22 per ton d/d for ton lots. Tri-sodium, £25 to £27 per ton d/d for ton lots.

Sodium Prussiate.—From 7¼d. per lb. ex store.

Sodium Silicate.—£9 15s. per ton, for 4-ton lots.

Sodium Sulphate (Glauber Salts).—£4 10s. per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. Spot £4 13s. 6d. per ton d/d station in bulk. MANCHESTER: about £4 2s. 6d. ex works.

Sodium Sulphide.—Solid 60/62%, Spot, £17 5s. per ton d/d in drums; crystals, 30/32%, £12 12s. per ton d/d in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; Pea crystals, spot, £18 10s. per ton d/d station in kegs; commercial, £12 15s. per ton d/d station in bags.

Sulphur.—Finely powdered, 17s. per cwt. d/d; precip. B.P., 68s. per cwt.

Sulphuric Acid.—168° Tw., £6 2s. 3d. to £6 13s. 3d. per ton; 140° Tw., arsenic-free, £4 7s. 6d. to £4 17s. 6d. per ton; 140° Tw. arsenious, £4 per ton; quotations naked at sellers' works.

Tartaric Acid.—2s. 6½d. per lb., less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 2s. 6½d. per lb.

Zinc Oxide.—Maximum prices: White seal, £30 17s. 6d. per ton; red seal, £28 7s. 6d. d/d; green seal, £29 17s. 6d. d/d buyers' premises.

Zinc Sulphate.—Tech., about £25, carriage paid, casks free.

Rubber Chemicals

Antimony Sulphide.—Golden, 10d. to 1s. 6d. per lb. Crimson, 1s. 9d. to 2s. per lb.

Arsenic Sulphide.—Yellow, 1s. 9½d. per lb.

Barytes.—Best white bleached, £7 3s. 6d. per ton.

Cadmium Sulphide.—5s. 5d. to 6s. 6d. per lb.

Carbon Black.—5d. to 8d. per lb., according to packing.

Carbon Bisulphide.—£33 5s. to £38 5s. per ton, according to quantity, in free returnable drums.

Carbon Tetrachloride.—£46 to £49 per ton.

Chromium Oxide.—Green, 1s. 6d. per lb.

India-rubber Substitutes.—White, 5¾d. to 8½d. per lb.; dark, 5½d. to 6d. per lb.

Lithopone.—30%, £25 per ton; 60%, £31 to £32 per ton. Imported material would be dearer.

Mineral Black.—£10 to £14 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£45 per ton.

Vermilion.—Pale or deep, 14s. 6d. per lb., for 7 lb. lots and less. Plus 5% War Charge.

Nitrogen Fertilisers

Ammonium Phosphate Fertilisers.—Type A, £21 8s.; B, £15 5s. 6d.; C, £18 17s. per ton in 6-ton lots, d/d farmer's nearest station up to June 30, 1941.

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station: March/June, £10 2s.

Calcium Cyanamide.—Nominal: supplies very scanty.

Concentrated Complete Fertilisers.—£15 10s. to £16 3s. 6d. per ton in 6-ton lots, d/d farmer's nearest station up to June 30, 1941. Supplies small except C.C.F. Special at £15 14s. per ton.

"Nitro-Chalk."—£9 14s. per ton in 6-ton lots, d/d farmer's nearest station up to June 30, 1941.

Sodium Nitrate.—Chilean, £13 10s. per ton in 2-ton lots, f.o.r. Liverpool, March delivery; agricultural, £10 14s. per ton in 2-cwt. bags, d/d farmer's nearest station up to June 30, 1941.

Coal Tar Products

Benzol.—Industrial (containing less than 2% of toluol), 2s. to 2s. 2d. per gal., ex works.

Carbolic Acid.—Crystals, 9½d. to 10⅜d. per lb.; Crude, 60's 3s. 6d. to 3s. 9½d., according to specification. MANCHESTER: Crystals, 10½d. per lb., d/d; crude, 3s. 7d. to 3s. 10d. naked at works.

Creosote.—Home trade, 5d. to 5½d. per gal., f.o.r., maker's works; exports 6d. to 6½d. per gal., according to grade. MANCHESTER: 5¼d. to 7¼d. per gal.

Cresylic Acid.—Pale, 99/100%, 2s. 2d. per gal. MANCHESTER: Pale, 99/100%, 2s. 2d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 3d. to 2s. 6d. per gal.; Heavy 90/190°, 1s. 7d. naked at works. MANCHESTER: 90/160°, 2s. 3d. to 2s. 6d.

Naphthalene.—Crude, whizzed or hot pressed, £14 per ton: purified crystals, £27 per ton in 2-cwt. bags; flaked, £27 per ton. Fire-lighter quality, £6 10s. to £7 10s. per ton ex works. MANCHESTER: Refined, £26 10s. per ton.

Pitch.—Medium, soft, nominal, f.o.b. MANCHESTER: Nominal.

Pyridine.—90/140°, 16s. 6d. per gal.: 90/160°, 13s. 6d.; 90/180°, 4s. to 5s. per gal., f.o.b. MANCHESTER: 13s. 6d. to 17s. per gal.

Toluol.—Pure, 2s. 5d., nominal. MANCHESTER: Pure, 2s. 5d. per gal., naked.

Xylol.—Commercial, 3s. 3d. per gal.; pure, 3s. 6d. MANCHESTER: 3s. 2d. to 3s. 6d. per gal.

Wood Distillation Products

Calcium Acetate.—Brown, £21 per ton; grey, £24. MANCHESTER: Grey, £23.

Methyl Acetone.—40.50%, £42 to £45 per ton.

Wood Creosote.—Unrefined, 2s. per gal., according to boiling range.

Wood Naphtha, Miscible.—4s. 6d. to 5s. per gal.; solvent, 5s. per gal.

Wood Tar.—£5 to £6 per ton, according to quality.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.

p-**Nitraniline.**—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb., in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.

Nitronaphthalene.—1s. 2d. per lb.; P.G., 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10 cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—March 13.—For the period ending March 29, per ton, net, naked, ex mill, works or refinery, and subject to additional charges according to package and location of supplies:—LINSEED OIL, raw, £41 10s. RAPESEED OIL, crude, £41 5s. COTTONSEED OIL, crude, £31 2s. 6d.; washed, £34 5s.; refined edible, £35 12s. 6d.; refined deodorised, £36 10s. SOYA BEAN OIL, crude, £33; refined deodorised, £37. COCONUT OIL, crude, £28 2s. 6d.; refined deodorised, £31 7s. 6d. PALM KERNEL OIL, crude, £27 10s.; refined deodorised, £30 15s. PALM OIL, refined deodorised, £37; refined hardened deodorised £41. GROUNDNUT OIL, crude, £35 10s.; refined deodorised, £40. WHALE OIL, crude hardened, 42 deg., £30 10s.; refined hardened, 42 deg., £33. ACID OILS.—Groundnut, £19; soya, £17; coconut and palm kernel, £22 10s. ROSIN, 25s. to 30s. per cwt., ex wharf., according to grade. TURPENTINE, 68s. 6d. per cwt. spot, American, including tax, ex wharf, in barrels, and ex discount.

LIVERPOOL.—March 12.—TURPENTINE, spot, American, 68s. 6d. per cwt.

Company News

Viscose Development Co., Ltd., have declared a final dividend of 7 per cent., making 10 per cent. (same).

Boots Pure Drug Co., Ltd., have declared the usual quarterly dividend of 6 per cent. on the ordinary 5s. shares for the quarter ending March 31.

Shawinigan Water and Power Co. announce a profit for the year of $9,538,979 (last year $8,405,031). Dividend for the year 90 cents per share (same).

International Paint and Compositions, Ltd., are paying a final dividend of 16 per cent. on ordinary shares, making a total for the year of 20 per cent. (same).

Bairds & Scottish Steel, Ltd., announce a final dividend of 5 per cent. on ordinary capital, making a total of 8 per cent., less tax (same); and a half-yearly dividend of 6 per cent. on preference shares (same).

The British Aluminium Co., Ltd., reports a net profit of £551,156 (last year £697,546). A final dividend of 7 per cent. (8½ per cent.) is recommended, making a total ordinary dividend of 10 per cent. (12½ per cent.).

Chemical Trade Inquiries

British India.—A firm of agents established at Bombay wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of essential oils, essences for aerated waters, soap colours, food colours, soap compounds, drugs and chemicals, picture varnishes and paint colours, perfumery, etc., for the Bombay Presidency. (Ref. No. 101.)

Canada.—A firm of agents established at Montreal wishes to obtain the representation, on a purchasing basis, of United Kingdom manufacturers of oleic acids for Canada. (Ref. No. 103.)

New Zealand.—H.M. Trade Commissioner at Wellington reports that the Post and Telegraph Department is calling for tenders (P. & T. 151/855) for the supply and delivery f.o.b. port of shipment of 1800 lb. solder, cored, resin filled, nominal size 13 S.W.G. to British Standard Specification No. 441. Tenders endorsed "Quotation for Resin-cored Solder" should be addressed to the Director-General (Stores Division), General Post Office, Wellington, C.I., New Zealand, by whom they will be received up to noon on April 15, 1941. (Ref. No. T. 15863/41.)

New Companies Registered

British Light Rubber Co., Ltd. (365,436). Private company. Capital £1000 on 1000 shares of £1 each. Manufacturers of and dealers in rubber produce, paints, compounds, etc. Directors: Geo. F. Bord, Wm. McClelland. Registered office: 131, Victoria Street, S.W.1.

Institute of Hydroponics, Ltd. (365,510). Private company. Capital £100 in 2000 shares of 1/- each. To carry on research in soil-less cultivation and scientific horticulture, to manufacture chemicals and apparatus, etc. Directors: Arthur E. Gough, Alfred Wragge; Wm. C. Russon; Mrs. Gladys N. Russon. Registered Office: 103, Cannon Street, E.C.4.

Chrome Synthetics, Ltd. (365,486.) Private company. Capital: £500 in 500 shares of £1 each. Manufacturers of and dealers in cotton, wool, silk, rubber, vulcanite, ebonite and synthetic substances and goods made wholly or partly therefrom, manufacturers of and dealers in chemicals, enamels, varnishes, polishes, etc. Subscribers: Reginald Garforth Cooke; Chas. H. Mellor. Solicitors: Thompson and Cooke, 138 Stamford Street, Stalybridge.

Clay-Alumin, Ltd. (365,761).—Private company. Capital: £500 in 500 shares of £1 each. Manufacturers and patentees of aluminium from clay and clay deposits, producers of aluminium from bauxite and other substances, etc. Directors: Ernest Penn; Carl W. Espensen; Franz Nehammer; Albert H. Salmon; and Leonard Yates. Solicitors: Geo. C. Carter and Co. Registered Office: 3 Arundel Street, W.C.2.

Polan (Petrol & Oil Resistors), Ltd. (365,746).—Private company. Capital: £1000 in 1000 shares of £1 each. Manufacturers and distributors of petrol and oil resisting liquid rubber and synthetic liquid rubber solutions, manufacturers of ordinary liquid rubber and synthetic rubber solutions, coaters and attachers of solutions to sponge and sheet rubber, metals, and other substances, etc. Directors: Mrs. Ida Pollacheck; Norman Parkinson. Solicitor: L. A. Fawke, 10 Harringay Park, N.8.

Limited Partnership

A.P.L. Fertiliser Company. (L.P.1403). Principal address: Oswestry, Salop. Partnership for 10 years from December 5, 1940. General partners: Crescens J. Allday, The Grange, Hollyfield Road, Sutton Coldfield; Reginald W. Lambert; Emily Lambert. Limited partners: Arnold E. Pearce, Birmingham; Mollie A. Pirrie.

Chemical and Allied Stocks and Shares

ALTHOUGH the general undertone of the stock and share markets was assisted by the strength of British Government securities, the volume of business remained on a very small scale. Compared with a week ago, industrial securities were slightly lower owing to the very moderate demand in evidence, but little selling was reported. The disposition now is to await not only the Budget, but also fuller details of the Government's industrial policy, recently outlined by the President of the Board of Trade. The latter is, of course, designed to concentrate resources, including labour and factory space, on war work, but at this stage it is impossible to assess how individual companies will be affected. Nevertheless, it is not surprising that shares of companies engaged in activities of national importance have shown a steadier tendency this week than those of concerns in trades not essential to the war effort.

The importance of chemical and allied activities is, of course, fully realised under existing conditions, and shares of most companies in the industry have been relatively steady, movements on balance not having exceeded a few pence. In various directions, hopeful market anticipations in regard to impending financial results assisted sentiment. Imperial Chemical were 29s. 1½d., which compares with 29s. 9d. a week ago, and the preference units declined 6d. to 32s. 6d. B. Laporte remained at 58s. 9d., but British Oxygen were easier at 65s. and British Aluminium were 10s. 6d., although Turner & Newall had a relatively steady appearance at around 66s. 3d. The units of the Distillers Co. were reactionary, however, and were around 62s., while United Molasses were 22s. 9d.

British Drug Houses again changed hands around 23s. and elsewhere Lawes Chemical showed business at 7s., while Greeff-Chemicals Holdings 5s. units were again quoted at 5s. 7½d. Cooper McDougall & Robertson remained around par, awaiting the financial results. Business in Fison Packard & Prentice took place at 31s. 3d. Pending the dividend announcement, Blythe Colour 4s. shares continued to be quoted at 6s. 6d. I.C.I. (Salt) 4½ per cent. debentures changed hands at 98 at one time. British Oil & Cake preferred ordinary remained around 37s. and Lever & Unilever were fairly steady at 22s. 6d., but Dunlop Rubber went back to 31s. 3d.

Recent dividend announcements imparted fairly steady conditions in the market for iron, steel and kindred shares, and Baldwins 4s. ordinary were quoted at 4s. 7¼d., while Stewarts & Lloyds were 42s. 9d., although Tube Investments eased to 90s. and Guest Keen were 21s. 9d. Associated Cement were less firm at 60s. 7½d., but British Plaster Board 5s. shares continued to be quoted at 13s., and were again fairly active. United Glass Bottle ordinary shares remained firm, awaiting the figures for the past year's working. Triplex Glass 10s. units were quoted at 18s. 3d. Elsewhere, Nairn & Greenwich went back to 52s. 6d. and Barry & Staines were 26s. 6d., while Wall Paper Manufacturers deferred units made the lower price of 19s. 6d., but as in most other directions, little selling was reported, and the lower prices were attributed mainly to the small demand in evidence.

Pinchin Johnson moved down to 18s. 6d., but International Paint were steady at 81s. 3d. Goodlass Wall 10s. ordinary were around par, and the preferred ordinary 10s. 9d. Boots Drug 5s. units were quoted at 35s. xd. and Timothy Whites at 19s., while Sangers were 16s. 6d., and in sympathy with the reactionary market tendency, Beechams Pills 2s. 6d. deferred units were at the slightly lower price of 7s. 10½d. Borax Consolidated remained at 26s. 10½d., aided by consideration of the statements at the recent annual meeting. Anchor Chemical 6 per cent. 10s. preference shares continued to be quoted at 10s. 9d. at Manchester. "Shell" and other leading oil shares were lower in accordance with the prevailing trend on the Stock Exchange this week.

ELECTROPHORESIS

It is well known that when a voltage is applied to a solution consisting of particles dispersed in a suitable medium, the particles will move along the electric field in a direction and with a speed of motion depending upon the nature of the substance. This phenomenon, named electrophoresis, has been applied particularly to colloidal solutions of aggregates with high molecular weight such as the protein, high-molecular dyestuffs, and polymerisation products, the first object being the analysis of such materials into homogeneous components. Electrophoresis apparatus of two designs (medium capacity form and convertible form), employing the sectionable U-tube, of the form developed by Professor A. Tiselius, has been developed by ADAM HILGER, LTD., 98 St. Pancras Way, London, N.W.1, and is now available. A full description and bibliography with details of the improved optical system employed is obtainable on application.